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ABSTRACT

Theoreticians have been asking for a long time what processes are involved in comprehension of figurative language, but psycholinguists have only recently addressed this question. One specific type of figurative expression, the metaphor, has been the focus of much recent research, in part because it promises to contribute much to the understanding of language processing in general and figurative language comprehension specifically. Most theories of semantic processing have focused on literal expressions, and several of these theories explained language processing successfully until they were extended to figurative expressions. Unlike literal expressions which are either true or false, metaphors interpreted literally are either false or nonsensical, and meaningful only if a figurative interpretation has been constructed. Metaphors are unique because they can be both literally meaningless or false and figuratively meaningful at the same time. The amount of psycholinguistic and cognitive research compiled on the metaphor does not reflect its historical importance in the development of language and concepts. For centuries metaphors have provided playwrights, authors, poets, and educators with a vehicle for creating new concepts and images, providing language users with a flexibility not available in literal expressions. (Author/MSE)

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Unearthing grounds: Some studies of metaphor comprehension*

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What are the processes involved in the comprehension of figurative language? Theoreticians have been asking this question since the time of Aristotle, but psycholinguists have only recently addressed this question. One specific type of figurative language expression, the metaphor, has been the focus of a great deal of research recently. One of the primary reasons that metaphor research has blossomed is that it promises to contribute much to an understanding of language processing in general, and more specifically, to an understanding of figurative language comprehension. Most theories of semantic processing have focused on literal expressions. Several of these theories quite successfully explained language processing until they were extended to figurative expressions.

Literal expressions are either literally true or false. On the other hand, metaphors interpreted literally are either false or nonsensical. They are meaningful only if a figurative interpretation has been constructed. Metaphors are unique because they can be both literally meaningless or false and figuratively meaningful at the same time. The amount of psycholinguistic and cognitive research compiled on metaphor does not reflect its historical importance in the development of language and concepts. For centuries metaphors have provided playwrights, authors, poets, and educators with a vehicle for creating new concepts and images. Metaphors have provided language users with a flexibility not available in literal expressions.

Theories of Metaphor Comprehension

Many different theories have been formulated to explain metaphor comprehension, but since the field is relatively new, no one theory dominates thought as yet. Despite differences in approach among the various theories, all tend to use the same terminology to refer to the metaphor components. Generally, metaphors consist of two elements, the topic and vehicle, and the relationship between the two, the ground (Billow, 1977; Richards, 1936). The topic refers to the subject of the metaphor and the vehicle is the term used metaphorically. The ground, which is the relationship between the topic and vehicle, gives the metaphor its meaning. For example, in the metaphor Mary is a gem, the topic is Mary, the vehicle is gem, and the ground is that Mary is precious or valued. In this example the ground was fairly easy to express, but this is not the case with all metaphors. The grounds of some metaphors are not easily or fully captured with a limited number of words.

Metaphors are apprehended when the relationship between the topic and vehicle is both discovered and understood. It is necessary to determine the ground in order to understand a metaphor. Determination of the ground goes beyond understanding the meaning of two words (the topic and vehicle). It involves an understanding of a more abstract relationship between the topic and vehicle. The processes involved in the formation of the relationship between the topic and vehicle are currently under investigation.

Philosophers, philologists, linguists, and psychologists all

emphasize different aspects of metaphor in their investigations. The two predominant theories of metaphor comprehension, the comparison and interaction theories, have been influenced by all of these disciplines. According to the comparison theory, as originally proposed by Aristotle, a word not literally used to denote a topic is substituted for one that is literally used to denote it (Billow, 1977). For example, in the metaphor John is a fox, the word fox has replaced the word sly. The vehicle of the metaphor, fox, was not chosen arbitrarily, but rather, was selected because it shares some attribute or characteristic with the topic. It is necessary to compare John to a fox in order to discover the characteristic that they have in common. Once it has been determined that both John and a fox are sly, the metaphor is understood (Billow, 1977; Ortony,1979a). The ground of the metaphor consists of the common properties or attributes. The number of shared attributes may vary from metaphor to metaphor. If the topic and vehicle share only one attribute and there is a direct association between the topic and vehicle in the semantic network, the ground is relatively simple. However, if there are a large number of common attributes intertwined in the semantic network, the ground is more complex.

According to the interaction theory of metaphor, the process of metaphor comprehension is not adequately explained by the mere comparison of the topic and vehicle to find the common attribute. Even when a common feature is identified its meaning may vary from context to context. For example, in Mary is a gem, one of the shared features is a sense of value. But the reason that Mary is valuable is most likely different from the reason a gem is valuable. The gem's value may be

assessed primarily in monetary terms, whereas Mary's value may have little to do with her monetary worth. The question arises as to which of these two meanings should be used to define the feature "valuable." Interactionists would respond to this question by stating that neither definition is adequate. They propose that a third, different meaning is created as a result of the interplay between the topic and vehicle. However, the meaning associated with the vehicle may influence construction of the ground more than the meaning associated with the topic (Ortony, 1979b; Verbrugge & McCarrell, 1977). The resultant meaning is a unique blend or melding of the characteristics associated with the topic and the vehicle. The metaphor enables one to "see" the topic in a new, unique way. The ground postulated by the interaction theory is a more abstract conceptual entity. This abstractness may make it difficult to capture the essence of the ground in verbal terms.

The distinction between the comparison and interaction theories is not clear-cut. Both are based on the notion that the metaphor meaning is derived from the relationship between the topic and vehicle. However, they differ on conceptualization of the ground. Studies based on the comparison theory generally emphasize the linguistic relationship between the topic and vehicle when describing the process of metaphor comprehension. On the other hand, those based on the interaction theory tend to emphasize the nonverbal components of the ground, such as imagery and the emergent properties.

A dimension on which theories from both orientations differ is the specificity of the ground. According to some theorists, each metaphor ground is unique and specific to one topic-vehicle combination.

Therefore, different metaphors could not share a specific ground, although specific grounds might have elements in common. Other theorists posit that the ground is a more general, abstract concept that can serve as the basis for several topic-vehicle combinations.

Comparison Theory Research

Much of the early contemporary research on metaphor comprehension is based on the comparison theory and the notion that metaphors can be understood in terms of word associations, as suggested in the theory proposed by Koen (1965). An underlying assumption of Koen's theory is that the metaphor vehicle is a substitute for a word that is literally used to denote the topic. As stated previously, in the metaphor John is a fox, the word fox is a substitute for the word sly. The topic and vehicle both have sets of attributes associated with them and some of the attributes associated with the topic are also associated with the vehicle. It is the overlap of these common assocations that forms the ground. Since a different set of common assocations result when fox is used instead of sly, the metaphorical sentence has a slightly different meaning.

More recently, a number of other theorists have suggested that word associations serve as the basis of metaphor formation and comprehension, but these theories tend to be somewhat more complex than Koen's (c.f. Johnson, 1970; Malgady & Johnson, 1976; Ortony, 1979a). For example, the influence of the number of common features and their salience has been considered in these later theories. Despite these additions to the

early theories, there are still several problems with the comparison theory of metaphor comprehension. One problem is the notion that the ground consists of shared features. A topic and vehicle may share many features that do not seem to contribute to the construction of the ground. For example, in John is a fox, the topic John and the vehicle fox have a number of features in common that do not facilitate comprehension of the metaphor. John and the fox are both animals, they are both warm blooded, both carnivorous, etc. How does one determine which of the common features are important for construction of the ground? The comparison theory does not answer that question.

A second problem is that once a common feature is identified it cannot be applied to the topic and vehicle in the same way. In other words, the shared feature is shared only metaphorically and cannot be applied literally to both the topic and the vehicle. For example, in Ted is a block of ice, the topic, Ted, and the vehicle, block of ice both share the feature of "coldness", but the meaning of "cold" is different when applied to Ted and when applied to the block of ice. Ted is emotionally cold and the block of ice is physically cold. They are not literally cold in the same way, the feature of coldness is thus shared in a more figurative sense.

Finally, the comparison theory does not adequately explain why metaphors often seem so novel and insightful. If the ground is based on similarities between the topic and vehicle that have always existed, why is the revelation of these similarities often surprising and unexpected? These questions remain unanswered by comparison theorists.

Interaction Theory Research

The theories mentioned thus far have been based on the comparison theory, in which the primary emphasis is on the linguistic relationship between the topic and vehicle. However, the results of a number of studies indicate that the ground is fairly abstract and that it may contain an imagery component. For example, Honeck, Riechmann and Hoffman (1975) found that interpretations of proverbs served as better prompts for recall than actual words (the topic and vehicle) from the proverb. Honeck et al. suggested that proverbs were initially encoded as abstract conceptual bases. Similar findings have been reported by Verbrugge and McCarrell (1977) who suggested that topic and vehicle domains play a role in formation of the ground and by Tourangeau and Sternberg (1982) who proposed that topic and vehicle domains, rather than features or categories, interact with one another to produce the ground.

The ground has been characterized as a semantic field, which is also a more general abstract conceptualization than features or categories, by Gildea and Glucksberg (1983). They found that priming the semantic fields of poor metaphors increased the comprehensibility of these metaphors. For example, the metaphor All marriages are iceboxes was understood more easily when primed with Some winters are cold (literal prime), Some people are cold (figurative prime). Even though the literal and figurative primes used different senses of the concept "cold", they both successfully primed the figurative sense of the concept "cold". In fact, the activation of a more general concept, such

as temperature (Some winters are cold, Some summers are hot) resulted in successful priming of poor metaphors (All marriages are iceboxes). Gildea and Glucksberg concluded that priming the appropriate semantic field provided subjects with the relevant dimension of the topic, thus increasing the metaphors comprehensibility.

In addition to a more abstract ground, some proponents of the interaction theory have suggested that the ground contains an imaginal as well as linguistic component (cf. Honeck et al., 1975; Paivio, 1979). The imagery component may be either symbolic or pictorial in nature. There have been a number of direct attempts to determine the role of pictorial imagery in metaphor comprehension. These investigations of the influence of pictorial imagery have produced mixed results. Some findings indicate that imagery facilitates metaphor comprehension (c.f. Harris, Lahey, & Marsalek, 1980), while others find no facilitory effect (Verbrugge & McCarrell, 1977), and still others argue that imagery may actually interfere with metaphor comprehension (Riechman & Coste, 1980). Many of these studies are plagued with procedural problems. For example, in the Harris et al. study, subjects were asked to indicate whether or not they had used imagery to encode each sentence after the entire sentence list had been presented. This meant that the subject had to be able to discriminate between the memory of creating an image and the inference that they must have created an image.

Several important questions have emerged from this recent research concerning the nature of the ground and the processes involved in metaphor comprehension. The first question concerns the specificity of the ground. Can a single ground serve as the basis for more than one

metaphor or does each metaphor have a uniquely specific ground? Is the ground fairly abstract and general or is it a specific relationship between a single topic-vehicle combination? In addition to questions concerning the specificity of the ground, there have been questions about whether the ground contains an imaginal component, a verbal component, or some combination of the two. These questions were addressed by my collegue, Dr. Joseph H. Danks, and myself in a series of three experiments.

The question of specificity of the ground was examined in the first experiment using a priming paradigm (End, 1982). The rationale was as follows; if grounds are fairly abstract and general, then several metaphors could be based on a common ground and act as effective primes for one another. In order to test this hypothesis, triads of metaphor related by meaning were generated. Since metaphor meaning is derived from the ground it was believed that metaphors with the same or similar meanings might share a common ground. For example, the metaphors Some roads are snakes, Some rivers are ribbons, and Some subways are worms, were thought to share a common ground. Several examples of the related metaphors are presented in Figure 1. A pilot study was conducted to

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Insert Figure 1 about here

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verify that the experimenters intuitions were accurate and that the majority of subjects agreed that metaphors within a triad actually had the same or similar meanings. Eight triads of related metaphors were embedded in a list of 24 filler metaphors, unrelated to the triads in

meaning, and 48 literal fillers. All sentences were of the form Some X are Y. Each sentence was presented individually and subjects were instructed to read the sentence quickly and accurately and indicate how difficult it was to understand by pressing one of three response keys (1=easy, 2=moderate, 3=difficult). Response times and difficulty ratings were recorded for each sentence. After all the sentences had been presented an unexpected cued recall test was given in which subjects were presented with a typed list of the sentences with a blank where the topic had been. They were instructed to complete each sentence with the appropriate topic.

The results indicated that priming was effective. Within the

Insert Figure 2 about here

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related metaphor triads, those metaphors in the second and third position were understood more quickly and were less difficult to understand than the metaphors in the first position. However, the decrease in response time and difficulty rating between the second and third metaphor was not nearly as large as the initial decrease between the first and second metaphor and was not significant. Recall for metaphors in the three positions did not differ, however, an interesting pattern emerged when recall confusions were examined. The subjects confused topics within related metaphor triads more than twice as often as they confused filler item topics.

The results of this experiment support the hypothesis that grounds are not specific mental constructs applicable to only one topic-vehicle

combination, but rather that grounds are more abstract, general constructs that can serve as the basis for a number of metaphors. Once the ground was constructed for the first metaphor in each triad it was not necessary to reconstruct it for the metaphors in the second and third position, thus they were understood more quickly and more easily. The fact that the majority of confusions on the recall task were confusions within triads also indicates that grounds are somewhat general. The topics of the metaphors based on a common ground could be interchanged but the metaphor's meaning was still retained. If the ground was specific to one topic-vehicle combination many fewer confusions within triads would be expected since any topic other than the correct one would totally change the meaning of the metaphor.

As demonstrated in the above experiment, it is possible to prime the ground of related metaphors by presenting these metaphors consecutively. However, it is not clear how strong the priming effect is or how much interference of the ground can be tolerated before priming is no longer effective. The strength of the priming effect was tested in the second experiment by inserting unrelated literal fillers between the pairs of related metaphors (End, 1984). The strength of the priming effect should decrease as the number of intervening fillers increases. Pairs of related metaphors were either presented consecutively (lag 0), were separated by 1 filler (lag 1), three fillers (lag 3), or 7 fillers (lag 7). Twenty pairs of related metaphors were embedded in a list of 20 filler metaphors and 75 literal fillers. Subjects read each sentence as it appeared and were instructed to go on to the next one when they understood what the displayed sentence meant.

Occasionally, sujects were asked to give their interpretation of a previously presented sentence. When all the sentences had been presented a recall task identical to that in the first experiment was presented.

The results were quite surprising. As in the first experiment a

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Insert Figure 3 about here

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priming effect was found when the related metaphors were presented consecutively (lag 0), but disappeared when the metaphors were separated by as few as one unrelated sentence. In fact, one sentence attentuated the priming effect just as much as three sentences did. Since the second metaphors in each related metaphor pair were understood in approximately the same amount of time whether they were preceeded by one or three literal fillers, it appears that the amount of time which elapsed between the prime and the target metaphor does not alone account for the lack of a priming effect. Perhaps the process of constructing the meaning of even one unrelated sentence results in the activation of an unrelated semantic field, so when the target metaphor is read it is necessary to reactivate the relevant semantic field in order to understand the second metaphor.

However, it is also possible that there was no facilitory priming effect in the second experiment because for some reason literal sentences attenuate the priming effect more than metaphorical sentences. Some researchers have argued that the processes underlying metaphor and literal language comprehension differ, and if this is the case, perhaps

switching from a metaphorical processing mode to a literal mode and back again would require additional cognitive processing capacity, resulting in a loss of any priming effect. Following this logic, one might expect to find a priming effect if the related metaphors were separated by an unrelated metaphor since processing capacity would not be directed toward changing processing strategies and could instead be used to maintain the prime in memory.

Alternatively, there may have been no priming effect because some imagery component of the ground was interfered with. The imagability of the literal fillers was not controlled in the second experiment, so all of the fillers could have been high in imagability resulting in a reduction of the priming effect. If subjects formed an image of the ground when the first metaphor was understood, and then formed an image of a highly imagable filler sentence, the filler image would interfere with maintenance of the prime image, resulting in the attenuation of the priming effect because the prime image would have to be reconstructed in order to understand the second metaphor.

The final experiment tested how varying the type of filler sentence and its imagability affected priming. The procedure was identical to that of Experiment 2 with the exception that there was only one filler sentence inserted between the pairs of related metaphors. The filler sentences varied on two dimensions; sentence type (literal or metaphorical), and imagability (high or low). The results indicated that there was no priming effect regardless of whether the filler was a literal or metaphorical sentence or whether it was high or low in imagability. Thus, the two tentative explanations for the results of

Experiment 2 were not supported. The lack of a priming effect does not appear to be due to the use of different processing strategies for literal and metaphorical expressions. This conclusion is supported by other research (c.f. Glucksberg, Gildea, & Bookin, 1982) which has disproved models based on the notion that metaphor comprehension involves more, or different, processing stages than literal language comprehension. Also, there was no support for the arguement that imagery plays a large role in metaphor comprehension. Both high and low imagery fillers reduced the priming effect the same amount. However, this finding may be due, in part, to the way imagery was operationalized in this experiment and previous research. There is a continuing debate over the form that imagery takes (c.f. Kosslyn, 1981; Pylyshyn, 1973) and perhaps it is not appropriate to operationalize imagery as a mental picture.

Conclusions

The results of these experiments support the notion that the metaphor ground is not specific to a particular topic-vehicle combination, but rather is a more general, abstract entity that may be shared by several different metaphors. Much of the current research suggests that the ground is a result of the interaction between the semantic fields of the topic and vehicle rather than the interaction between the individual words in the metaphor. However, additional research is necessary to determine how the relationship between the semantic fields is formed and how the elements of the semantic field are interrelated.

The finding that metaphors can be primed successfully with other

metaphors or literal expressions illustrates the importance of context in metaphor comprehension. The prime establishes the context needed to understand the target expression. Recently, researchers have begun to examine metaphor comprehension in situations where adequate linguistic, social, and emotional context is provided. The findings of these studies are very different from those of earlier research which suggested that metaphors were more difficult to understand than literal expressions and that extra processing steps were involved in metaphor comprehension. Given adequate context, there is no difference in the amount of time it takes to understand literal and nonliteral expressions (Gibbs, 1978).

Imagery, in the form of mental pictures, does not seem to contribute much to the formation of the metaphor ground. At least subjects did not seem to spontaneously create mental pictures in order to facilitate metaphor comprehension. In some of the imagery studies discussed earlier, subjects were told to create a mental picture of the metaphor meaning and were better able to remember the sentences. However, it is not clear that forming a mental image made the sentences any easier to understand or that an image would have been formed without explicit instructions to do so. It is possible that imagery does play a role in metaphor comprehension, but not in the form of a mental picture. Perhaps the imagery is propositional or nonpictoral and nonverbal. It is also possible that some individuals use imagery when understanding metaphors and others rely on linguistic processing. These individual differences may be masked by the statistical procedures used to analyze the data. To date, the only type of imagery discussed in the metaphor

comprehension research has been mental pictures. Other types of imagery must be considered before it can be concluded that imagery does not play a role in metaphor comprehension.

The question raised at the beginning of this paper is still far from being answered, but there has been considerable progress toward discovering how figurative language, specifically metaphors, is understood. The research discussed here has contributed not only to an understanding of the processes involved in figurative language comprehension but also promises to contribute much to an understanding of language processing in general.

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Figure Captions

Figure 1. Several examples of triads and pairs of related metaphors used in Experiments 1, 2, and 3.

Figure 2. Mean response time for related metaphors as a function of ordinal position in a triad.

Figure 3. Mean response times of related metaphor pairs as a function of lag.

Some pillows are marshmellows.

Some skies are silk.

Some clouds are cotton.

Some drugs are handcuffs.

Some marriages are prisons.

Some jobs are jails.

Some fogs are coats.

Some mists are veils.

Some frosts are cloaks.

Some voices are gravel.

Some hands are sandpaper.

Some flowers are fireworks.

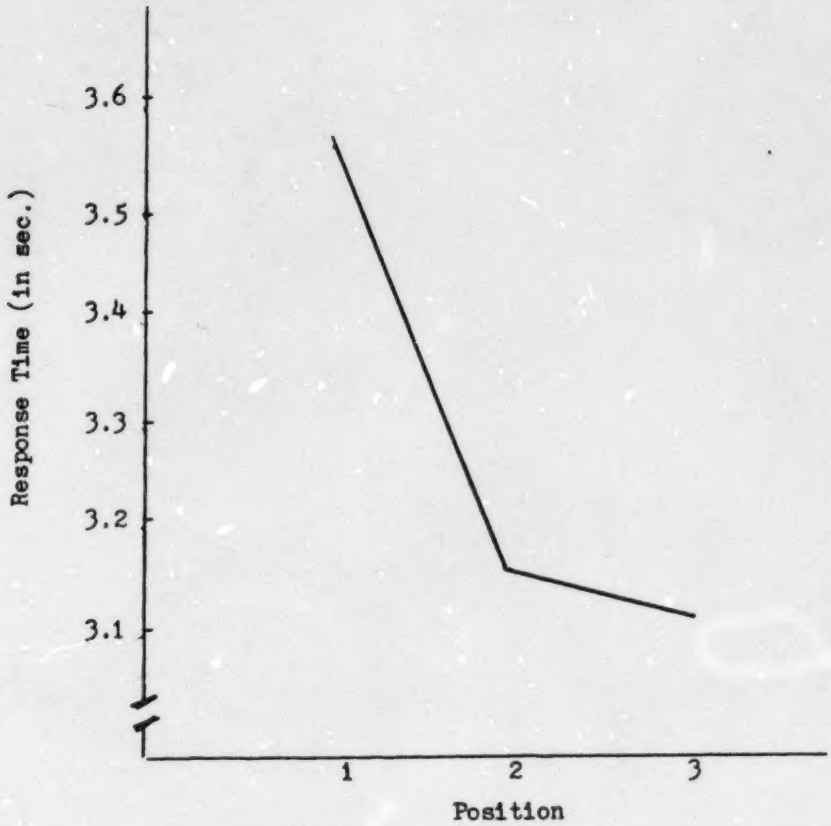
Some sunsets are rainbows.

Some frisbees are spaceships.

Some baseballs are comets.

Some popsicles are towers.

Some candles are lighthouses.


Response Time (in sec.)
3.6
3.5
3.4
3.3
3.2
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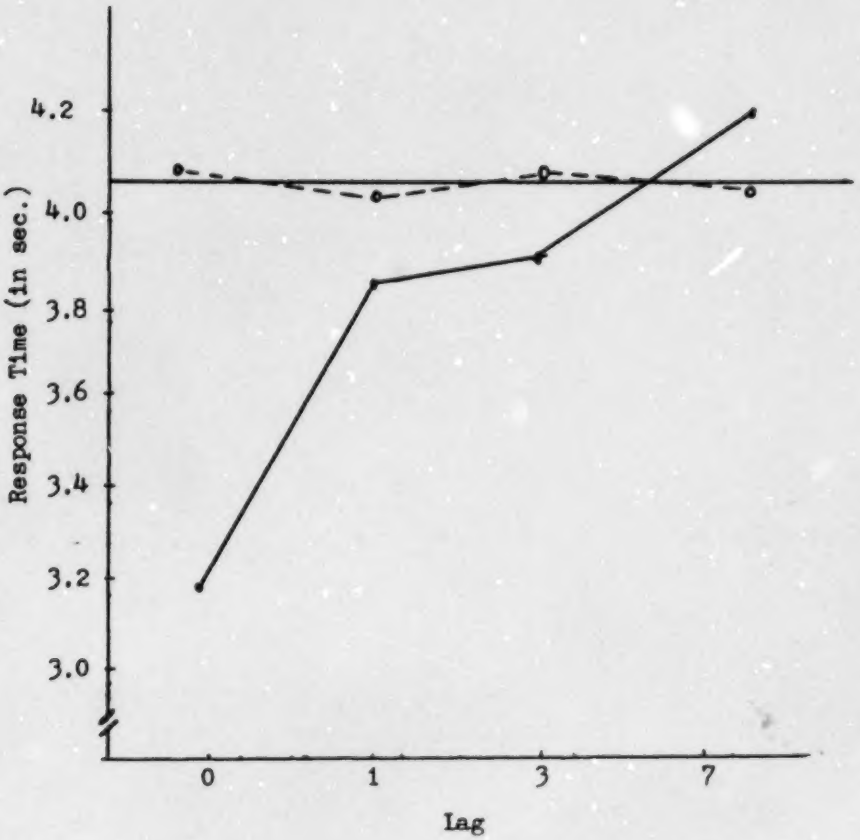
2
3
Position


4.2
4.0
3.8
3.6
3.4
3.2
3.0
Response Time (in sec.)
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1
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